IFW AF/1763 #
CC

Attorney Docket: 0325.00324

IN RE APPLICATION OF: Kenneth G. Flugaur et al.

RESPONSE TRANSMITTAL AND EXTENSION OF TIME REQUEST (IF REQUIRED)

SERIAL NO.: 09/460,638

TITLE: CHANNEL SLEEVE, IMPROVED PLASMA PROCESSING CHAMBER CONTAINING CHANNEL SLEEVE AND METHODS OF MAKING AND USING THE SAME

FILED: December 14, 1999

EXAMINER: Zervigon, R.

ART UNIT: 1763

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA22313-1450

FEE CALCULATION FOR ENCLOSED AND EXTENSION REQUEST (IF ANY)

	Claims Remaining	Highest No. Previous	Extra Rate	Additional Fee
Total Claims	11 minus	20 =	0 x $ 18.00	$ 0.00
Independent Claims	5 minus	5 =	0 x $ 80.00	$ 0.00
Multiple Dependent Claim First Added			+ $270.00	$ 0.00

TOTAL IF NOT SMALL ENTITY . . $0.00

[ ] SMALL ENTITY STATUS - If applicable, divide by 2 . . . . . $0.00
[ ] Verified statement enclosed, if not previously filed.

[ ] Applicant also requests a _____ month extension of time for response to the outstanding Office Action. The fee is $0.00

[X] Fee set forth for Appeal Brief $330.00

TOTAL FEE $330.00

The Commissioner is hereby authorized to charge any overpayment or underpayment of the above fee associated with this Communication to Deposit Account No. 50-0541. A duplicate copy of this sheet is attached.

CHRISTOPHER P. MAIORANA, P.C.

By: _____
Christopher P. Maiorana
Registration No.: 42,829

24840 Harper Avenue, Suite 100
St. Clair Shores, Michigan 48080
(810) 498-0670

I hereby certify that this letter, the response or amendment attached hereto are being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 8, 2004.

By: Jan M. Dunbar
Jan M. Dunbar

Our Docket No.: 0325.00324

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant:	Kenneth G. Flugaur et al.		
Application No.:	09/460,638	Examiner:	Zervigon, R.
Filed:	December 14, 1999	Art Group:	1763
For:	CHANNEL SLEEVE, IMPROVED PLASMA PROCESSING CHAMBER CONTAINING CHANNEL SLEEVE AND METHODS OF MAKING AND USING THE SAME		

CERTIFICATE OF MAILING

I hereby certify that this letter, the response or amendment attached hereto are being deposited with the United States Postal Service as first class mail in an envelope addressed to Mail Stop Appeal Brief Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 8, 2004.

By: Jan M. Dunbar
Jan M. Dunbar

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellants submit, in triplicate, the following Appeal Brief pursuant to 37 C.F.R. §1.192 for consideration by the Board of Patent Appeals and Interferences. Appellants also submit herewith a PTO-2038 Form in the amount of $330.00 to cover the cost of filing the opening brief as required by 37 C.F.R. §1.17(c). Please charge any additional fees or credit any overpayment to our Deposit Account Number 50-0541.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest is the Assignee, Cypress Semiconductor Corporation.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to the Appellants, Appellants' legal representative, or Assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-20 are pending and remain rejected. The Appellants hereby appeal the rejection of claims 1-20.

IV. STATUS OF AMENDMENTS

Appellants are appealing a Final Office Action issued by the Examiner on December 8, 2003. On February 6, 2004, Appellants filed a response requesting reconsideration. On March 9, 2004, the Examiner issued an Advisory indicating that the rejections in the December 8, 2003 Final Office Action were maintained. On April 9, 2004, Appellants filed a Notice of Appeal.

V. SUMMARY OF INVENTION

The present invention concerns a device comprising a one-piece outer portion (FIG. 1 channel sleeve 10). The one-piece outer portion may consists of an electrically insulative material (page 8 lines 1-13) and having dimensions effective to prevent or inhibit plasma arcing (page 9 lines

17-page 10 line 1) to an electrically conductive surface (FIG. 2A Aluminum material, page 13 lines 15-18) of an aperture (FIG. 2B, aperture 20) through a wall of a plasma processing chamber (FIG. 2B). The one-piece outer portion further comprises (i) a flange section (FIG. 1, flange 13) configured to remain outside of the wall (page 10 lines 17-20), (ii) a lower section (FIG. 1, section 11) having a shape (FIG. 1 W1, page 9 line19-page 10 line 1 and page 10 lines 10-16) approximate the aperture to fit into the aperture (page 10 lines 17-21) and (iii) an inner opening (FIG. 1, channel defined by inner surface 14, page 11 lines 9-12) communicating through the electrically insulative material between a bottom (FIG. 1, bottom 12) and a top (FIG. 1, top 18) of the outer portion.

VI. ISSUES

The first issue is whether claims 1-10, 12-17 and 20 are patentable under 35 U.S.C. §103(a) over Foster et al, U.S. Patent No. 5,665,640 (hereafter Foster) in view of Ishikawa et al., U.S. Patent No. 6,143,078 (hereafter Ishikawa).

The second issue is whether claims 11, 18 and 19 are patentable under 35 U.S.C. §103(a) over Foster in view of Ishikawa and Curtis, U.S. Patent No. 4,328,068.

VII. GROUPING OF CLAIMS

Appellants contend that the claims of the present invention do not stand or fall together. In particular, the following groups of claims are separately patentable:

Group 1: Claims 1, 2, 3, 6, 16, 17, 19 and 20 stand together.

Group 2: Claims 4 and 8 stand together.

Group 3: Claim 5 stands alone.

Group 4: Claims 9 and 11 stand together.

Group 5: Claim 7 stands alone.

Group 6: Claim 10 stands alone.

Group 7: Claims 12, 14 and 15 stand together.

Group 8: Claim 13 stands alone.

Group 9: Claim 18 stands alone.

The claim(s) in each group is(are) separately patentable from the claim(s) in any other groups.

VIII. ARGUMENTS

A. 35 U.S.C.§ 103

"[T]o establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicants."[1] "[T]he factual inquiry whether to combine references must be thorough and searching."[2] "This factual question ... [cannot] be resolved on subjective belief and unknown authority."[3] "It must be based on objective evidence of record."[4] The

---

[1] *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1316 (Fed. Cir. 2000) (citing *In re Dance*, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998); *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)).

[2] *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir. 2001).

[3] *In re Lee*, 277 F.3d 1338, 1343-44, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002).

[4] *Id.* at 1343, 61 USPQ2d at 1434.

Examiner must show that (a) there is some suggestion or motivation, either in the references or in the knowledge generally available to one of ordinary skill in the art, to modify or combine the references, (b) there is a reasonable expectation of success, and (c) the prior art reference (or combination of references) teaches or suggests all of the claim limitations.[5] Furthermore, The Court of Appeals for the Federal Circuit has indicated that the requirement for showing the teaching of motivation to combine references is "rigorous" and must be "clear and particular".[6]

1. Group 1 (claims 1, 2, 3, 6, 16, 17, 19 and 20) is fully patentable over Foster and Ishikawa

Group 1 provides a one-piece outer portion having dimensions effective to prevent or inhibit plasma arching to an electrically conducted surface of an aperture. Despite the assertion by the Examiner, the text in column 18, lines 33-58 of Foster appears to be silent regarding dimensions of an isolator sleeve 271 (asserted to be similar to the claimed one-piece outer portion) being effective to prevent or inhibit plasma arching.[7] In particular, the text of Foster cited by the Examiner reads:

> Accordingly, the RF showerhead/electrode 222 has also been modified. Showerhead/electrode 222 includes a stem 252 without a flange. Instead, a slight ridge 266 is formed around stem 252, and as shown in FIG. 2A, ridge 266 supports a generally circular ceramic tray 268 which is formed from a ceramic material, such as alumina (99.7% Al_2O_3), similar to the ceramic isolator sleeves 154, 156 shown in FIG. 2A. Ceramic tray 268 is supported by ridge 266, and in turn, supports isolator sleeves 270, 271. Isolator sleeves 270, 271 are also preferably made of a ceramic insulator material similar to that used for sleeves 154, 156 of FIG. 2A. As with the embodiments used to practice the present

---

[5] Manual of Patent Examining Procedure (M.P.E.P.), Eighth Edition, Revised February 2003, §2142.

[6] *In re Anita Dembiczak* and *Benson Zinbarg*, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999)

[7] Office Action, December 8, 2003, page 2, item 2i, first line.

> invention which are discussed above, **preferably the holes of showerhead/electrode 22 are approximately 1/32 (0.0313) inches in diameter to prevent the formation of a plasma inside cylinder 238** and to confine the plasma generally below the showerhead/electrode 222 and above the susceptor 230. The embodiment of FIG. 2B utilizes quartz cylinder 238 and **eliminates the metal attachment screws proximate showerhead/electrode 222 which helps to prevent the formation of a plasma within cylinder 238 and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal.** A layer of insulation 272 may be placed atop gas distributor cover 239 to prevent contact by an operator, because the gas distributor cover 239 becomes very hot during operation. (Emphasis added)[8]

Nowhere in the above text, or in another section does Foster appear to indicate that dimensions of the isolator sleeve 271 are responsible for preventing or inhibiting plasma arching. In contrast, Foster states that plasma formation is prevented inside the cylinder 238 where the isolator sleeve 271 resides:

> The embodiment of FIG. 2B utilizes quartz cylinder 238 and eliminates the metal attachment screws proximate showerhead/electrode 222 which **helps to prevent the formation of a plasma within cylinder 238** and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal. (Emphasis added)[9]

Since the isolator sleeve 271 of Foster is not exposed to the plasma, the isolator sleeve 271 does not appear to prevent or inhibit plasma arching. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest a one-piece outer portion having dimensions effective to prevent or inhibit plasma arching to an electrically conductive surface of an aperture as presently claimed.

Group 1 further provides an electrically conductive surface of an aperture through a wall of a plasma processing chamber. Contrary to the assertion by the Examiner, the showerhead/electrode 222 of Foster does not appear to be a **surface of an aperture** that the Examiner defines as "within

---

[8] Foster, column 18, lines 33-58.

[9] Foster, column 18, lines 48-50.

cylinder 238".[10] Instead, the showerhead/electrode 222 of Foster appears to be a separate element mounted at an end of the cylinder 238 of Foster. Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest an electrically conductive surface of an aperture through a wall of a plasma processing chamber as presently claimed.

Assuming, *arguendo*, that the showerhead/electrode 222 of Foster is a surface "within cylinder 238" (for which Appellants' representative does not necessarily agree), the resulting structure of the shower/head 222 and the cylinder 238 forms the assembly 226 of Foster, not an aperture through a wall (housing 42 and cover 43 in FIG. 2A or cover 232 in FIG. 2B of Foster) of a plasma processing chamber. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest an electrically conductive surface of an aperture through a wall of a plasma processing chamber as presently claimed.

Furthermore, the assertion by the Examiner that "Foster teaches the at least one aperture ("within cylinder 238"; col. 18, line 53) having an exposed electrically conductive surface (item 222; Fig. 2B; col 18 lines 50-58), **and located inside the aperture**" (emphasis added)[11] is moot for arguing language different than as claimed. In particular, claim 1 provides that the claimed conductive surface is of the claimed aperture, not at some location inside the aperture. Therefore, *prima facie* obviousness has not been established for lack of evidence that Foster and Ishikawa teach all of the claim limitations.

Group 1 further provides a flange section of the one-piece outer portion configured to remain outside a wall of a processing chamber. In contrast, the Examiner admits that Foster does not teach

---

[10] Office Action, December 8, 2003, page 2, item 2i.

[11] Office Action, December 8, 2003, page 9, last paragraph.

an element having a flange outside an aperture through a chamber.[12] To fill the missing claimed flange element, the Examiner asserts that a gas nozzle 302 of Ishikawa is similar to the isolator sleeve 271 of Foster. However, one of ordinary skill in the art would not appear to agree with the assertion that the isolator sleeve 271 and gas nozzle 302 are similar devices. In particular, the isolator sleeve 271 of Foster is a ceramic cylinder surrounding an RF line 256. The gas nozzle 302 of Ishikawa is metal[13] and does not surround anything. The isolator sleeve 271 provides electrical isolation. The gas nozzle 302 imparts physical direction to a flowing gas. The devices are made of different material, have different shapes and have different uses. Furthermore, no evidence has been provided by the Examiner that one of ordinary skill in the art would consider a ceramic insulator sleeve to be similar to a metal gas nozzle. As such, the Examiner's assertion that the gas nozzle 302 of Ishikawa is similar to the ceramic insulator sleeve 271 of Foster appears to be merely a conclusory statement lacking supporting evidence. Therefore, the Examiner has failed to provide clear and concise evidence that the isolator sleeve 271 of Foster and the gas nozzle 302 of Ishikawa are similar devices to one of ordinary skill in the art. As such, *prima facie* obviousness has not been established to modify the isolator sleeve 271 of Foster with the gas nozzle 302 of Ishikawa.

Assuming, *arguendo*, that modifying the isolator sleeve 271 of Foster to have a flange per the gas nozzle 302 of Ishikawa is obvious (for which the Appellants' representative does not necessarily agree), the proposed combination still does not place the flange **outside a wall** of a processing chamber as presently claimed. In particular, FIG. 5 of Ishikawa shows that the flange of the gas nozzle 302 is **inside the wall** (port 314) of the processing chamber. In particular, the gas

---

[12] Office Action, December 8, 2003, page 7, lines 14-18.

[13] See section line definition in M.P.E.P. §608.02.

nozzle 302 appears to be screwed into the port 314 moving right to left until the flange portion of the gas nozzle 302 reaches the threads within the port 314. Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest a flange section of the one-piece outer portion configured to remain outside a wall of a processing chamber as presently claimed.

Furthermore, the assertion by the Examiner that, "a flange section configured to remain **outside the aperture**" (emphasis added) is moot for arguing language different than as claimed.[14] In particular, claim 1 provides a flange section configured to remain **outside of the wall**. Therefore, *prima facie* obviousness has not been established for lack of evidence that Foster and Ishikawa teach all of the claim limitations.

Furthermore, *prima facie* obvious has not been established for lack of clear particular evidence of motivation to combine the references. In particular, the Examiner asserts that motivation is provided in column 10, lines 20-28 of Ishikawa to "enhance hermeticity of the process chamber."[15] The text of Ishikawa cited by the Examiner reads:

> When the gas ring is positioned over the gas channel, the passages are in communication with the channel. The gas distribution ring is sealed in the top surface of the chamber wall via two separately placed O-rings 322, 324 disposed outwardly from the channel to prevent gas leaks to the interior of the chamber. A polytetrafluoroethylene (PTFE) seal 326, such as Teflon™. or other similar products, is disposed inwardly of the channel in a recess 328 to prevent gas leakage into the chamber.[16]

Nowhere in the above quoted text, or in any other section, does Ishikawa appear to discuss the flange of the gas nozzle 302 providing "enhance hermeticity". Instead, the assertive motivation appears

---

[14] Office Action, December 8, 2003, page 8, lines 1-2.

[15] Office Action, December 8, 2003, page 8, lines 9-10.

[16] Ishikawa, column 10, lines 20-28.

to be merely a conclusory statement. Therefore, *prima facie* obviousness has not been established for lack of evidence of motivation to combine the references.

Furthermore, no evidence of a reasonable expectation of success has been provided. In particular, the Examiner has been silent regarding the possibility of the proposed combination succeeding. Therefore, *prima facie* obviousness has not been established for lack of evidence of a reasonable expectation of success for the proposed combination.

In summary, *prima facie* obviousness has not been established for (i) lack of evidence that Foster and Ishikawa teach all of the claim limitations, (ii) lack of evidence of motivation to combine the references and (iii) lack of evidence for a reasonable expectation of success. As such, group 1 is fully patentable over the cited references and the rejection should be reversed.

2. Group 2 (claims 4 and 8) is fully patentable over Foster and Ishikawa

Group 2 provides method of processing a workpiece using the device of group 1. Therefore, group 2 provides (from group 1) a one-piece outer portion having dimensions effective to prevent or inhibit plasma arching to an electrically conducted surface of an aperture. Despite the assertion by the Examiner, the text in column 18, lines 33-58 of Foster appears to be silent regarding dimensions of an isolator sleeve 271 (asserted to be similar to the claimed one-piece outer portion) being effective to prevent or inhibit plasma arching.[17] In particular, the text of Foster cited by the Examiner reads:

> Accordingly, the RF showerhead/electrode 222 has also been modified. Showerhead/electrode 222 includes a stem 252 without a flange. Instead, a slight ridge 266 is formed around stem 252, and as shown in FIG. 2A, ridge 266 supports a generally

[17] Office Action, December 8, 2003, page 2, item 2i, first line.

> circular ceramic tray 268 which is formed from a ceramic material, such as alumina (99.7% Al_2O_3), similar to the ceramic isolator sleeves 154, 156 shown in FIG. 2A. Ceramic tray 268 is supported by ridge 266, and in turn, supports isolator sleeves 270, 271. Isolator sleeves 270, 271 are also preferably made of a ceramic insulator material similar to that used for sleeves 154, 156 of FIG. 2A. As with the embodiments used to practice the present invention which are discussed above, **preferably the holes of showerhead/electrode 22 are approximately 1/32 (0.0313) inches in diameter to prevent the formation of a plasma inside cylinder 238** and to confine the plasma generally below the showerhead/electrode 222 and above the susceptor 230. The embodiment of FIG. 2B utilizes quartz cylinder 238 and **eliminates the metal attachment screws proximate showerhead/electrode 222 which helps to prevent the formation of a plasma within cylinder 238 and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal**. A layer of insulation 272 may be placed atop gas distributor cover 239 to prevent contact by an operator, because the gas distributor cover 239 becomes very hot during operation. (Emphasis added)[18]

Nowhere in the above text, or in another section does Foster appear to indicate that dimensions of the isolator sleeve 271 are responsible for preventing or inhibiting plasma arching. In contrast, Foster states that plasma formation is prevented inside the cylinder 238 where the isolator sleeve 271 resides:

> The embodiment of FIG. 2B utilizes quartz cylinder 238 and eliminates the metal attachment screws proximate showerhead/electrode 222 which **helps to prevent the formation of a plasma within cylinder 238** and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal. (Emphasis added)[19]

Since the isolator sleeve 271 of Foster is not exposed to the plasma, the isolator sleeve 271 does not appear to prevent or inhibit plasma arching. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest a one-piece outer portion having dimensions effective to prevent or inhibit plasma arching to an electrically conductive surface of an aperture as presently claimed.

---

[18] Foster, column 18, lines 33-58.

[19] Foster, column 18, lines 48-50.

Group 2 further provides an electrically conductive surface of an aperture through a wall of a plasma processing chamber. Contrary to the assertion by the Examiner, the showerhead/electrode 222 of Foster does not appear to be a **surface of an aperture** that the Examiner defines as "within cylinder 238".[20] Instead, the showerhead/electrode 222 of Foster appears to be a separate element mounted at an end of the cylinder 238 of Foster. Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest an electrically conductive surface of an aperture through a wall of a plasma processing chamber as presently claimed.

Assuming, *arguendo*, that the showerhead/electrode 222 of Foster is a surface "within cylinder 238" (for which Appellants' representative does not necessarily agree), the resulting structure of the shower/head 222 and the cylinder 238 forms the assembly 226 of Foster, not an aperture through a wall (housing 42 and cover 43 in FIG. 2A or cover 232 in FIG. 2B of Foster) of a plasma processing chamber. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest an electrically conductive surface of an aperture through a wall of a plasma processing chamber as presently claimed.

Furthermore, the assertion by the Examiner that "Foster teaches the at least one aperture ("within cylinder 238"; col. 18, line 53) having an exposed electrically conductive surface (item 222; Fig. 2B; col 18 lines 50-58), **and located inside the aperture**" (emphasis added)[21] is moot for arguing language different than as claimed. In particular, claim 1 provides that the claimed conductive surface is of the claimed aperture, not at some location inside the aperture. Therefore,

---

[20] Office Action, December 8, 2003, page 2, item 2i.

[21] Office Action, December 8, 2003, page 9, last paragraph.

prima facie obviousness has not been established for lack of evidence that Foster and Ishikawa teach all of the claim limitations.

Group 2 further provides a flange section of the one-piece outer portion configured to remain outside a wall of a processing chamber. In contrast, the Examiner admits that Foster does not teach an element having a flange outside an aperture through a chamber.[22] To fill the missing claimed flange element, the Examiner asserts that a gas nozzle 302 of Ishikawa is similar to the isolator sleeve 271 of Foster. However, one of ordinary skill in the art would not appear to agree with the assertion that the isolator sleeve 271 and gas nozzle 302 are similar devices. In particular, the isolator sleeve 271 of Foster is a ceramic cylinder surrounding an RF line 256. The gas nozzle 302 of Ishikawa is metal[23] and does not surround anything. The isolator sleeve 271 provides electrical isolation. The gas nozzle 302 imparts physical direction to a flowing gas. The devices are made of different material, have different shapes and have different uses. Furthermore, no evidence has been provided by the Examiner that one of ordinary skill in the art would consider a ceramic insulator sleeve to be similar to a metal gas nozzle. As such, the Examiner's assertion that the gas nozzle 302 of Ishikawa is similar to the ceramic insulator sleeve 271 of Foster appears to be merely a conclusory statement lacking supporting evidence. Therefore, the Examiner has failed to provide clear and concise evidence that the isolator sleeve 271 of Foster and the gas nozzle 302 of Ishikawa are similar devices to one of ordinary skill in the art. As such, *prima facie* obviousness has not been established to modify the isolator sleeve 271 of Foster with the gas nozzle 302 of Ishikawa.

---

[22] Office Action, December 8, 2003, page 7, lines 14-18.

[23] See section line definition in M.P.E.P. §608.02.

Assuming, *arguendo*, that modifying the isolator sleeve 271 of Foster to have a flange per the gas nozzle 302 of Ishikawa is obvious (for which the Appellants' representative does not necessarily agree), the proposed combination still does not place the flange **outside a wall** of a processing chamber as presently claimed. In particular, FIG. 5 of Ishikawa shows that the flange of the gas nozzle 302 is **inside the wall** (port 314) of the processing chamber. In particular, the gas nozzle 302 appears to be screwed into the port 314 moving right to left until the flange portion of the gas nozzle 302 reaches the threads within the port 314. Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest a flange section of the one-piece outer portion configured to remain outside a wall of a processing chamber as presently claimed.

Furthermore, the assertion by the Examiner that, "a flange section configured to remain **outside the aperture**" (emphasis added) is moot for arguing language different than as claimed.[24] In particular, claim 1 provides a flange section configured to remain **outside of the wall**. Therefore, *prima facie* obviousness has not been established for lack of evidence that Foster and Ishikawa teach all of the claim limitations.

Group 2 further provides a step for transmitting a signal through the device out from the plasma processing chamber. Despite the assertion by the Examiner, the reactor 40 in FIG. 2 of Foster does not appear to show an RF signal passing **out** from the reactor 40.[25] In particular, an arrowhead on a line connecting an RF Power Source 57 to the reactor 40 of Foster points **into** the reactor 40. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest a step

---

[24] Office Action, December 8, 2003, page 8, lines 1-2.

[25] Office Action, December 8, 2003, page 3, item 2vb.

for transmitting a signal through a device out from a plasma processing chamber as presently claimed.

Furthermore, *prima facie* obvious has not been established for lack of clear particular evidence of motivation to combine the references. In particular, the Examiner asserts that motivation is provided in column 10, lines 20-28 of Ishikawa to "enhance hermeticity of the process chamber."[26] The text of Ishikawa cited by the Examiner reads:

> When the gas ring is positioned over the gas channel, the passages are in communication with the channel. The gas distribution ring is sealed in the top surface of the chamber wall via two separately placed O-rings 322, 324 disposed outwardly from the channel to prevent gas leaks to the interior of the chamber. A polytetrafluoroethylene (PTFE) seal 326, such as Teflon™. or other similar products, is disposed inwardly of the channel in a recess 328 to prevent gas leakage into the chamber.[27]

Nowhere in the above quoted text, or in any other section, does Ishikawa appear to discuss the flange of the gas nozzle 302 providing "enhance hermeticity". Instead, the assertive motivation appears to be merely a conclusory statement. Therefore, *prima facie* obviousness has not been established for lack of evidence of motivation to combine the references.

Furthermore, no evidence of a reasonable expectation of success has been provided. In particular, the Examiner has been silent regarding the possibility of the proposed combination succeeding. Therefore, *prima facie* obviousness has not been established for lack of evidence of a reasonable expectation of success for the proposed combination.

In summary, *prima facie* obviousness has not been established for (i) lack of evidence that Foster and Ishikawa teach all of the claim limitations, (ii) lack of evidence of motivation to combine

---

[26] Office Action, December 8, 2003, page 8, lines 9-10.

[27] Ishikawa, column 10, lines 20-28.

the references and (iii) lack of evidence for a reasonable expectation of success. Furthermore, Foster and Ishikawa do not teach a step of transmitting a signal through a device out from a plasma processing chamber. As such, group 2 is fully patentable over the cited references and the rejection should be reversed.

3. Group 3 (claim 5) is fully patentable over Foster and Ishikawa

Group 3 provides a one-piece sleeve having dimensions effective to prevent or inhibit plasma arching to an exposed electrically conducted surface of an aperture. Despite the assertion by the Examiner, the text in column 18, lines 33-58 of Foster appears to be silent regarding dimensions of an isolator sleeve 271 (asserted to be similar to the claimed one-piece outer portion) being effective to prevent or inhibit plasma arching.[28] In particular, the text of Foster cited by the Examiner reads:

> Accordingly, the RF showerhead/electrode 222 has also been modified. Showerhead/electrode 222 includes a stem 252 without a flange. Instead, a slight ridge 266 is formed around stem 252, and as shown in FIG. 2A, ridge 266 supports a generally circular ceramic tray 268 which is formed from a ceramic material, such as alumina (99.7% Al_2O_3), similar to the ceramic isolator sleeves 154, 156 shown in FIG. 2A. Ceramic tray 268 is supported by ridge 266, and in turn, supports isolator sleeves 270, 271. Isolator sleeves 270, 271 are also preferably made of a ceramic insulator material similar to that used for sleeves 154, 156 of FIG. 2A. As with the embodiments used to practice the present invention which are discussed above, **preferably the holes of showerhead/electrode 22 are approximately 1/32 (0.0313) inches in diameter to prevent the formation of a plasma inside cylinder 238** and to confine the plasma generally below the showerhead/electrode 222 and above the susceptor 230. The embodiment of FIG. 2B utilizes quartz cylinder 238 and **eliminates the metal attachment screws proximate showerhead/electrode 222 which helps to prevent the formation of a plasma within cylinder 238 and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal**. A layer of insulation 272 may be placed atop gas

---

[28] Office Action, December 8, 2003, page 4, item 2viia.

> distributor cover 239 to prevent contact by an operator, because the gas distributor cover 239 becomes very hot during operation. (Emphasis added)[29]

Nowhere in the above text, or in another section does Foster appear to indicate that dimensions of the isolator sleeve 271 are responsible for preventing or inhibiting plasma arching. In contrast, Foster states that plasma formation is prevented inside the cylinder 238 where the isolator sleeve 271 resides:

> The embodiment of FIG. 2B utilizes quartz cylinder 238 and eliminates the metal attachment screws proximate showerhead/electrode 222 which **helps to prevent the formation of a plasma within cylinder 238** and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal. (Emphasis added)[30]

Since the isolator sleeve 271 of Foster is not exposed to the plasma, the isolator sleeve 271 does not appear to prevent or inhibit plasma arching. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest a one-piece sleeve having dimensions effective to prevent or inhibit plasma arching to an exposed electrically conductive surface of an aperture as presently claimed.

Group 3 further provides a wall of a plasma processing chamber and at least one aperture through the wall. Despite the assertion by the Examiner, an inside of the cylinder 238 of Foster does not appear to be an aperture through a wall of a reactor 40 (asserted similar to the claimed plasma processing chamber).[31] In particular, FIG. 2B of Foster illustrates that the cylinder 238 does not extend through the housing cover 232. As such, the inside of the cylinder 238 cannot reach through the wall of the reactor 40. Therefore, Foster and Ishikawa, alone or in combination, do not teach or

---

[29] Foster, column 18, lines 33-58.

[30] Foster, column 18, lines 48-50.

[31] Office Action, December 8, 2003, page 3, item 2vi.

suggest a wall of a plasma processing chamber and at least one aperture through the wall as presently claimed.

Group 3 further provides an exposed electrically conductive surface of an aperture through a wall of a plasma processing chamber. Contrary to the assertion by the Examiner, the showerhead/electrode 222 of Foster does not appear to be a **surface of an aperture** that the Examiner defines as "within cylinder 238".[32] Instead, the showerhead/electrode 222 of Foster appears to be a separate element mounted at an end of the cylinder 238 of Foster. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest an exposed electrically conductive surface of an aperture through a wall of a plasma processing chamber as presently claimed.

Assuming, *arguendo*, that the showerhead/electrode 222 of Foster is a surface "within cylinder 238" (for which Appellants' representative does not necessarily agree), the resulting structure of the shower/head 222 and the cylinder 238 forms the assembly 226 of Foster, not an aperture through a wall (housing 42 and cover 43 in FIG. 2A or cover 232 in FIG. 2B of Foster) of a plasma processing chamber. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest an exposed electrically conductive surface of an aperture through a wall of a plasma processing chamber as presently claimed.

Group 3 further provides a flange section of the one-piece outer portion configured to remain outside a wall of a processing chamber. In contrast, the Examiner admits that Foster does not teach an element having a flange outside an aperture through a chamber.[33] To fill the missing claimed flange element, the Examiner asserts (in arguing the flange of claim 1) that a gas nozzle 302 of

---

[32] Office Action, December 8, 2003, page 4, item 2vi, lines 1-2.

[33] Office Action, December 8, 2003, page 7, lines 14-18.

Ishikawa is similar to the isolator sleeve 271 of Foster. However, one of ordinary skill in the art would not appear to agree with the assertion that the isolator sleeve 271 and gas nozzle 302 are similar devices. In particular, the isolator sleeve 271 of Foster is a ceramic cylinder surrounding an RF line 256. The gas nozzle 302 of Ishikawa is metal[34] and does not surround anything. The isolator sleeve 271 provides electrical isolation. The gas nozzle 302 imparts physical direction to a flowing gas. The devices are made of different material, have different shapes and have different uses. Furthermore, no evidence has been provided by the Examiner that one of ordinary skill in the art would consider a ceramic insulator sleeve to be similar to a metal gas nozzle. As such, the assertion that the gas nozzle 302 of Ishikawa is similar to the ceramic insulator sleeve 271 of Foster appears to be merely a conclusory statement lacking supporting evidence. Therefore, the Examiner has failed to provide clear and concise evidence that the isolator sleeve 271 of Foster and the gas nozzle 302 of Ishikawa are similar devices to one of ordinary skill in the art. As such, *prima facie* obviousness has not been established to modify the isolator sleeve 271 of Foster with the gas nozzle 302 of Ishikawa.

Assuming, *arguendo*, that modifying the isolator sleeve 271 of Foster to have a flange per the gas nozzle 302 of Ishikawa is obvious (for which the Appellants' representative does not necessarily agree), the proposed combination still does not place the flange **outside a wall** of a processing chamber as presently claimed. In particular, FIG. 5 of Ishikawa shows that the flange of the gas nozzle 302 is **inside the wall** (port 314) of the processing chamber. In particular, the gas nozzle 302 appears to be screwed into the port 314 moving right to left until the flange portion of the gas nozzle 302 reaches the threads within the port 314. Therefore, Foster and Ishikawa, alone

---

[34] See section line definition in M.P.E.P. §608.02.

or in combination, do not appear to teach or suggest a flange section of the one-piece outer portion configured to remain outside a wall of a processing chamber as presently claimed.

Furthermore, *prima facie* obvious has not been established for lack of clear particular evidence of motivation to combine the references. In particular, the Examiner asserts (in arguing claim 1) that motivation is provided in column 10, lines 20-28 of Ishikawa to "enhance hermeticity of the process chamber."[35] The text of Ishikawa cited by the Examiner reads:

> When the gas ring is positioned over the gas channel, the passages are in communication with the channel. The gas distribution ring is sealed in the top surface of the chamber wall via two separately placed O-rings 322, 324 disposed outwardly from the channel to prevent gas leaks to the interior of the chamber. A polytetrafluoroethylene (PTFE) seal 326, such as Teflon™. or other similar products, is disposed inwardly of the channel in a recess 328 to prevent gas leakage into the chamber.[36]

Nowhere in the above quoted text, or in any other section, does Ishikawa appear to discuss the flange of the gas nozzle 302 providing "enhance hermeticity". Instead, the assertive motivation appears to be merely a conclusory statement. Therefore, *prima facie* obviousness has not been established for lack of evidence of motivation to combine the references.

Furthermore, no evidence of a reasonable expectation of success has been provided. In particular, the Examiner has been silent regarding the possibility of the proposed combination succeeding. Therefore, *prima facie* obviousness has not been established for lack of evidence of a reasonable expectation of success for the proposed combination.

In summary, *prima facie* obviousness has not been established for (i) lack of evidence that Foster and Ishikawa teach all of the claim limitations, (ii) lack of evidence of motivation to combine

---

[35] Office Action, December 8, 2003, page 8, lines 9-10.

[36] Ishikawa, column 10, lines 20-28.

the references and (iii) lack of evidence for a reasonable expectation of success. Furthermore, Foster and Ishikawa do not teach an aperture through a wall as presently claimed. As such, group 3 is fully patentable over the cited references and the rejection should be reversed.

4. Group 4 (claims 9 and 11) is fully patentable over Foster and Ishikawa

Group 4 provides methods of operating a plasma processing chamber having the device of group 1. Therefore, group 4 provides (from group 1) a one-piece outer portion having dimensions effective to prevent or inhibit plasma arching to an electrically conducted surface of an aperture. Despite the assertion by the Examiner (in arguing claim 1), the text in column 18, lines 33-58 of Foster appears to be silent regarding dimensions of an isolator sleeve 271 (asserted to be similar to the claimed one-piece outer portion) being effective to prevent or inhibit plasma arching.[37] In particular, the text of Foster cited by the Examiner reads:

> Accordingly, the RF showerhead/electrode 222 has also been modified. Showerhead/electrode 222 includes a stem 252 without a flange. Instead, a slight ridge 266 is formed around stem 252, and as shown in FIG. 2A, ridge 266 supports a generally circular ceramic tray 268 which is formed from a ceramic material, such as alumina (99.7% Al_2O_3), similar to the ceramic isolator sleeves 154, 156 shown in FIG. 2A. Ceramic tray 268 is supported by ridge 266, and in turn, supports isolator sleeves 270, 271. Isolator sleeves 270, 271 are also preferably made of a ceramic insulator material similar to that used for sleeves 154, 156 of FIG. 2A. As with the embodiments used to practice the present invention which are discussed above, **preferably the holes of showerhead/electrode 22 are approximately 1/32 (0.0313) inches in diameter to prevent the formation of a plasma inside cylinder 238** and to confine the plasma generally below the showerhead/electrode 222 and above the susceptor 230. The embodiment of FIG. 2B utilizes quartz cylinder 238 and **eliminates the metal attachment screws proximate showerhead/electrode 222 which helps to prevent the formation of a plasma within cylinder 238 and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal**. A layer of insulation 272 may be placed atop gas

[37] Office Action, December 8, 2003, page 2, item 2i, first line.

distributor cover 239 to prevent contact by an operator, because the gas distributor cover 239 becomes very hot during operation. (Emphasis added)[38]

Nowhere in the above text, or in another section does Foster appear to indicate that dimensions of the isolator sleeve 271 are responsible for preventing or inhibiting plasma arching. In contrast, Foster states that plasma formation is prevented inside the cylinder 238 where the isolator sleeve 271 resides:

> The embodiment of FIG. 2B utilizes quartz cylinder 238 and eliminates the metal attachment screws proximate showerhead/electrode 222 which **helps to prevent the formation of a plasma within cylinder 238** and to prevent arcing between the RF line 256 and showerhead/electrode 222 and any of the surrounding metal. (Emphasis added)[39]

Since the isolator sleeve 271 of Foster is not exposed to the plasma, the isolator sleeve 271 does not appear to prevent or inhibit plasma arching. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest a one-piece outer portion having dimensions effective to prevent or inhibit plasma arching to an electrically conductive surface of an aperture as presently claimed.

Group 4 further provides an electrically conductive surface of an aperture through a wall of a plasma processing chamber. Contrary to the assertion by the Examiner, the showerhead/electrode 222 of Foster does not appear to be a **surface of an aperture** that the Examiner defines as "within cylinder 238".[40] Instead, the showerhead/electrode 222 of Foster appears to be a separate element mounted at an end of the cylinder 238 of Foster. Therefore, Foster and Ishikawa, alone or in

---

[38] Foster, column 18, lines 33-58.

[39] Foster, column 18, lines 48-50.

[40] Office Action, December 8, 2003, page 6, item 2xi.

combination, do not appear to teach or suggest an electrically conductive surface of an aperture through a wall of a plasma processing chamber as presently claimed.

Assuming, *arguendo*, that the showerhead/electrode 222 of Foster is a surface "within cylinder 238" (for which Appellants' representative does not necessarily agree), the resulting structure of the shower/head 222 and the cylinder 238 forms the assembly 226 of Foster, not an aperture through a wall (housing 42 and cover 43 in FIG. 2A or cover 232 in FIG. 2B of Foster) of a plasma processing chamber. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest an electrically conductive surface of an aperture through a wall of a plasma processing chamber as presently claimed.

Group 4 further provides a flange section of the one-piece outer portion configured to remain outside a wall of a processing chamber. In contrast, the Examiner admits that Foster does not teach an element having a flange outside an aperture through a chamber.[41] To fill the missing claimed flange element, the Examiner asserts (in arguing the flange of claim 1) that a gas nozzle 302 of Ishikawa is similar to the isolator sleeve 271 of Foster. However, one of ordinary skill in the art would not appear to agree with the assertion that the isolator sleeve 271 and gas nozzle 302 are similar devices. In particular, the isolator sleeve 271 of Foster is a ceramic cylinder surrounding an RF line 256. The gas nozzle 302 of Ishikawa is metal[42] and does not surround anything. The isolator sleeve 271 provides electrical isolation. The gas nozzle 302 imparts physical direction to a flowing gas. The devices are made of different material, have different shapes and have different uses. Furthermore, no evidence has been provided by the Examiner that one of ordinary skill in the

---

[41] Office Action, December 8, 2003, page 7, lines 14-18.

[42] See section line definition in M.P.E.P. §608.02.

art would consider a ceramic insulator sleeve to be similar to a metal gas nozzle. As such, the Examiner's assertion that the gas nozzle 302 of Ishikawa is similar to the ceramic insulator sleeve 271 of Foster appears to be merely a conclusory statement lacking supporting evidence. Therefore, the Examiner has failed to provide clear and concise evidence that the isolator sleeve 271 of Foster and the gas nozzle 302 of Ishikawa are similar devices to one of ordinary skill in the art. As such, *prima facie* obviousness has not been established to modify the isolator sleeve 271 of Foster with the gas nozzle 302 of Ishikawa.

Assuming, *arguendo*, that modifying the isolator sleeve 271 of Foster to have a flange per the gas nozzle 302 of Ishikawa is obvious (for which the Appellants' representative does not necessarily agree), the proposed combination still does not place the flange **outside a wall** of a processing chamber as presently claimed. In particular, FIG. 5 of Ishikawa shows that the flange of the gas nozzle 302 is **inside the wall** (port 314) of the processing chamber. In particular, the gas nozzle 302 appears to be screwed into the port 314 moving right to left until the flange portion of the gas nozzle 302 reaches the threads within the port 314. Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest a flange section of the one-piece outer portion configured to remain outside a wall of a processing chamber as presently claimed.

Furthermore, the assertion by the Examiner (in arguing the flange of claim 1) that, "a flange section configured to remain **outside the aperture**" (emphasis added) is moot for arguing language different than as claimed.[43] In particular, claim 1 provides a flange section configured to remain **outside of the wall**. Therefore, *prima facie* obviousness has not been established for lack of evidence that Foster and Ishikawa teach all of the claim limitations.

---

[43] Office Action, December 8, 2003, page 8, lines 1-2.

Group 4 further provides steps for initiating a plasma in a chamber then cleaning the chamber and a device. Despite the assertion by the Examiner, column 30, line 14 of Foster does not appear to discuss cleaning the isolator sleeve 271 (asserted similar to the claimed device).[44] The cited text of Foster reads:

> The improvement in yield indicates that the CVD-Ti process provides more uniform and repeatable results over the surface of the wafer, and suggests that the process may overcome minor contact to contact variations that are created by the contact etch and contact cleaning processes.[45]

The above text appears to contemplate cleaning a contact region of a wafer. Nowhere in the above text, or in any other section, does Foster appear to discuss cleaning the isolator sleeve 271. Furthermore, Foster state that plasma formation is prevented inside the cylinder 238 where the isolator sleeve 271 resides.[46] Since the isolator sleeve 271 of Foster is not exposed to the plasma, no cleaning of the isolator sleeve 271 by the plasma appears to take place. Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest initiating a plasma in a chamber then cleaning the chamber and a device as presently claimed.

Furthermore, *prima facie* obvious has not been established for lack of clear particular evidence of motivation to combine the references. In particular, the Examiner asserts (in arguing claim 1) that motivation is provided in column 10, lines 20-28 of Ishikawa to "enhance hermeticity of the process chamber."[47] The text of Ishikawa cited by the Examiner reads:

---

[44] Office Action, December 8, 2003, page6, item 2xib.

[45] Foster, column 30, lines 10-14.

[46] Foster, column 18, lines 48-50.

[47] Office Action, December 8, 2003, page 8, lines 9-10.

> When the gas ring is positioned over the gas channel, the passages are in communication with the channel. The gas distribution ring is sealed in the top surface of the chamber wall via two separately placed O-rings 322, 324 disposed outwardly from the channel to prevent gas leaks to the interior of the chamber. A polytetrafluoroethylene (PTFE) seal 326, such as Teflon™. or other similar products, is disposed inwardly of the channel in a recess 328 to prevent gas leakage into the chamber.[48]

Nowhere in the above quoted text, or in any other section, does Ishikawa appear to discuss the flange of the gas nozzle 302 providing "enhance hermeticity". Instead, the assertive motivation appears to be merely a conclusory statement. Therefore, *prima facie* obviousness has not been established for lack of evidence of motivation to combine the references.

Furthermore, no evidence of a reasonable expectation of success has been provided. In particular, the Examiner has been silent regarding the possibility of the proposed combination succeeding. Therefore, *prima facie* obviousness has not been established for lack of evidence of a reasonable expectation of success for the proposed combination.

In summary, *prima facie* obviousness has not been established for (i) lack of evidence that Foster and Ishikawa teach all of the claim limitations, (ii) lack of evidence of motivation to combine the references and (iii) lack of evidence for a reasonable expectation of success. Furthermore, Foster and Ishikawa do not teach a step of cleaning a device. As such, group 4 is fully patentable over the cited references and the rejection should be reversed.

---

[48] Ishikawa, column 10, lines 20-28.

5. Group 5 (claim 7) is fully patentable over Foster and Ishikawa

Group 5 depend from group 1 and thus contains all of the limitations of group 1. Consequently, the arguments presented above in support of the patentability of group 1 are incorporated hereunder in support of group 5.

Group 5 further provides forming a bottom of a one-piece sleeve to a plane having a non-orthogonal angle relative to an inner opening of the one-piece sleeve. In contrast, the Examiner admits that Foster does not teach forming a bottom of the isolator sleeve 271 at a non-orthogonal angle[49]. However, Ishikawa appears to be silent and the Examiner offers no evidence that Ishikawa teaches the claimed non-orthogonal angle. Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest forming a bottom of a one-piece sleeve to a plane having a non-orthogonal angle relative to an inner opening of the one-piece sleeve as presently claimed.

Furthermore, the Examiner's assertion that "it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art"does not appear to be relevant as group 5 changes a shape, not a dimension, of the one-piece sleeve.[50] Furthermore, the fact that references can be combined or modified is not sufficient to establish *prima facie* obviousness.[51] No explanation is provided why one of ordinary skill in the art would reshape the bottom of the one-piece sleeve. Therefore, *prima facie* obviousness has not been established for lack of evidence (i) that Foster and Ishikawa teach every claim limitation and (ii) motivation to modify Foster. As such, group 5 is fully patentable over the cited references and the rejection should be reversed.

---

[49] Office Action, December 8, 2003, page 7, lines16-18.

[50] Office Action, December 8, 2003, page 8, lines 10-12.

[51] M.P.E.P., Eighth Edition, Revised February 2003, §1243.01.

6. Group 6 (claim 10) is fully patentable over Foster and Ishikawa

Group 6 depend from group 4 and thus contains all of the limitations of group 4. Consequently, the arguments presented above in support of the patentability of group 4 are incorporated hereunder in support of group 6.

Group 6 further provides that the plasma exists in the chamber for a predetermined period of time. Despite the assertion by the Examiner, the text in column 3, lines 1-7 of Foster appear to be silent regarding generating a plasma in a chamber for a predetermined period of time.[52] The text of Foster cited by the Examiner reads:

> ...increased amount of titanium that must be deposited, thus increasing the amount of titanium applied and etched away, increasing the titanium deposition time, and increasing the etching time that is necessary to remove excess titanium. Accordingly, as IC device geometries continue to shrink and aspect ratios increase, deposition of titanium-containing layers by sputtering becomes very costly.[53]

Nowhere in the above cited text, or in any other section, does Foster appear to discuss plasm being generated for a predetermined period. Therefore, Foster and Ishikawa, alone or in combination, do not teach or suggest a plasma existing in a chamber for a predetermined amount of time as presently claimed.

Furthermore, the assertion by the Examiner that a plasma cannot exist for an infinite amount of time does not address the claim language.[54] The claim language provides a **predetermined** period, not a finite period. Therefore, the Examiner has not provided any evidence that Foster

---

[52] Office Action, December 8, 2003, page 6, item 2xii.

[53] Foster, column 3, lines 1-7.

[54] Office Action, December 8, 2003, page 11, item 13.

teaches a plasma generating period that is predetermined. As such, group 6 is fully patentable over the cited references and the rejection should be reversed.

7. Group 7 (claims 12, 14 and 15) is fully patentable over Foster and Ishikawa

Group 7 depend from group 1 and thus contains all of the limitations of group 1. Consequently, the arguments presented above in support of the patentability of group 1 are incorporated hereunder in support of group 7.

Group 7 further provides a flange section having a width that is greater than a corresponding width of an aperture through a wall of a processing chamber. In contrast, the Examiner admits that Foster does not teach a flange section for the isolator sleeve 271.[55] Furthermore, the gas nozzle 302 of Ishikawa does not appear to be disposed in an aperture through a wall of a processing chamber, so no size of the flange on the gas nozzle 302 relative to the missing aperture can be determined. Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest a flange section having a width that is greater than a corresponding width of an aperture through a wall of a processing chamber as presently claimed. As such, group 7 is fully patentable over the cited references and the rejection should be reversed.

8. Group 8 (claim 13) is fully patentable over Foster and Ishikawa

Group 8 depend from group 7 and thus contains all of the limitations of group 7. Consequently, the arguments presented above in support of the patentability of group 7 are incorporated hereunder in support of group 8.

---

[55] Office Action, December 8, 2003, page 7, lines 14-16.

Group 8 further provides that the device applies a predetermined amount of pressure against an inner wall of the aperture. In contrast, Foster appears to be silent regarding the isolator sleeve 271 applying pressure against an inner wall "within cylinder 238". Therefore, Foster and Ishikawa, alone or in combination, do not appear to teach or suggest a device applying a predetermined amount of pressure against an inner wall of an aperture as presently claimed.

Furthermore, the assertion by the Examiner that "the predetermined amount of pressure against a wall of the aperture as claimed is taught by Foster according to the fasting means (see screws, not labeled; Figure 2B)" is incorrect because the screws in FIG. 2B of Foster (i) are not part of the one-piece isolator sleeve 271 and (ii) do not apply a pressure to the asserted inner wall "within cylinder 238".[56] As such, group 8 is fully patentable over the cited references and the rejection should be reversed.

9. Group 9 (claim 18) is fully patentable over Foster, Ishikawa and Curtis

Group 9 depend from group 1 and thus contains all of the limitations of group 1. Consequently, the arguments presented above in support of the patentability of group 1 are incorporated hereunder in support of group 9.

Group 9 further provides that the inner opening transfers a spectroscopic endpoint detection signal. In contrast, the Examiner has failed to establish *prima facie* obviousness for lack of clear and particular evidence of motivation to combine the references. In particular, the Examiner argues that motivation exists "for determining the end point of the plasma etching process".[57] However, the title

---

[56] Office Action, December 8, 2003, page 7, item 2xvi.

[57] Office Action, December 8, 2003, page 9, lines 5-6.

of Foster indicates that the plasma is used for enhancing chemical vapor **deposition** of thin films of titanium. Foster appears to be silent regarding a plasma **etch**. Therefore, one or ordinary skill in the art would have no apparent motivation to add a plasma endpoint detection capability to the chamber of Foster which does not appear to perform any plasm etching.

Furthermore, the assertion by the Examiner that Foster teaches etching in column 2, lines 22-35 and column 7, lines 60-65 appears to be incorrect.[58] In particular, the cited text of Foster appears to discuss depositing titanium on substrates and plasma-enhanced chemical vapor deposition:

> There are low temperature physical techniques available for depositing titanium on temperature sensitive substrates. Sputtering is one such technique involving the use of a target of layer material and an ionized plasma.[59]

> The invention may be utilized to deposit various different rims by a low temperature CVD; however, it is particularly useful in depositing titanium-containing films such as titanium nitride (TiN) at low temperatures and especially pure titanium metal. FIG. 1 shows one embodiment of an upstream plasma source with a rotating susceptor for practicing the upstream plasma-enhanced CVD of the present invention.[60]

None of the cited lines of text in Foster appear to discuss plasma etching as asserted by the Examiner. Therefore, *prima facie* obviousness has not been established for lack of evidence that Foster, Ishikawa and Curtis teach all of the claim limitations.

Furthermore, the proposed modification of the isolator sleeve 271 of Foster per Curtis would appear to conflict with the principle of operation of the isolator sleeve 271 and is, therefore, not a proper basis for a conclusion of obviousness.[61] The principle of operation for the isolator sleeve 271

---

[58] Office Action, December 8, 2003, page 12, item 15.

[59] Foster, column 2, lines 22-35.

[60] Foster, column 7, lines 60-65.

[61] M.P.E.P., Eight Edition, Revised February 2003, §2143.01.

of Foster appears to be isolating an RF line 256 from reactant gasses (See Foster, column 15, lines 29-33 for a discussion of a similar isolator sleeve 154). Modifying the isolator sleeve 271 of Foster to operate as a light pipe, as taught by Curtis, appears to be incompatible with isolating the RF line 256. Nothing in Foster, Ishikawa or Curtis provides an explanation how the isolator sleeve 271 can be modified to transmit light emitted from the plasma with the RF line 256 still in place and thus blocking the plasma light. If the RF line 256 is removed to permit the light to pass, the isolator sleeve 271 no longer performs the operation of isolating the RF line 256. As such, the motivation asserted by the Examiner appears to alter the principle of operation of Foster and thus the combination does not appear to be appropriate.

Furthermore, a first assertion by the Examiner that the proposed combination would replace the RF signal of Foster with the light signal of Curtis is illogical since light signals cannot pass through the metal conductors used to carry the RF signals.[62] A second assertion by the Examiner to have both signals present during processing as suggested by Curtis does not appear to result in the claim language.[63] FIG. 3 of Curtis shows two distinct structures used to carry the RF signals and the light signals. Applying the teachings of Curtis to Foster would appear to add a second structure distinct from the isolator sleeve 271 of Foster to convey the light signals. Therefore, the proposed combination still would not transfer a spectroscopic endpoint detection signal thru an inner opening of a one-piece outer portion as presently claimed. Thus, *prima facie* obviousness has not been established for lack of evidence that the references teach all of the claim limitations. As such, group 9 is fully patentable over the cited references and the rejection should be reversed.

---

[62] Office Action, December 8, 2003, page 12, item 16.

[63] Office Action, December 8, 2003, page 12, item 16.

Groups 1-9 are separately patentable.

During prosecution, each independent and dependent claim is considered to be separately patentable over every other claim.[64] As such, each of the above groups is considered to be separately patentable over every other group.[65] In particular, each of the groups includes a unique combination of arguments that allow individual groups to stand over the references even if all of the other groups fall.

Group 2 includes an argument that Foster and Ishikawa do not teach or suggest a step of transmitting a signal through a device out from a plasma processing chamber. Since group 1 does not depend on the transmitting argument, group 2 may be found patentable even if group 1 is not.

Group 3 includes an argument that Foster and Ishikawa do not teach or suggest an aperture through a wall. Since groups 1-2 do not depend on the aperture argument, group 3 may be found patentable even if groups 1 and/or 2 are not.

Group 4 includes an argument that Foster and Ishikawa do not teach or suggest a step of cleaning a device. Since groups 1-3 do not depend on the aperture argument, group 4 may be found patentable even if groups 1, 2 and/or 3 are not.

Group 5 includes an argument that Foster and Ishikawa do not teach or suggest a non-orthogonal angle. Since groups 1-4 do not depend on the non-orthogonal angle argument, group 5 may be found patentable even if groups 1-3 and/or 4 are not.

---

[64] See, e.g., *Rowe v. Dror*, 42 USPQ2d 1550, 1552 (Fed. Cir. 1997), *Preemption Devices, Inc. v. Minnesota Mining and Manufacturing Company*, 221 USPQ 841, 843 (Fed. Cir. 1984), and *Jones v. Hardy*, 727 F.2d 1524, 1528, 220 USPQ 1021, 1024 (Fed. Cir. 1984) (It is well established that each claim in a patent constitutes a separate invention.).

[65] M.P.E.P., Eighth Edition, Revised February 2003, §1206.

Group 6 includes an argument that Foster and Ishikawa do not teach or suggest a predetermined period of time. Since groups 1-5 do not depend on the time argument, group 6 may be found patentable even if groups 1-4 and/or 5 are not.

Group 7 includes an argument that Foster and Ishikawa do not teach or suggest a flange section having a width that is greater than a corresponding width of an aperture. Since groups 1-6 do not depend on the flange section argument, group 7 may be found patentable even if groups 1-5 and/or 6 are not.

Group 8 includes an argument that Foster and Ishikawa do not teach or suggest a predetermined amount of pressure. Since groups 1-7 do not depend on the pressure argument, group 8 may be found patentable even if groups 1-6 and/or 7 are not.

Group 9 includes an argument that Foster, Ishikawa and Curtis do not teach or suggest a spectroscopic endpoint detection signal. Since groups 1-8 do not depend on the endpoint detection argument, group 9 may be found patentable even if groups 1-7 and/or 8 are not.

B. CONCLUSION

None of the cited references suggest a one-piece outer portion having dimensions effective to prevent or inhibit plasma arching to an electrically conducted surface of an aperture as presently claimed. No clear and particular evidence of motivation has been provided to combine Foster with Ishikawa. No evidence of a reasonable expectation of success has been provided for the proposed combinations. Hence, the Examiner has clearly erred with respect to the patentability of the claimed invention. It is respectfully requested that the Board overturn the Examiner's rejection of all pending claims, and hold that the claims are not rendered obvious by the cited references. However, should

the Board find the arguments herein in support of independent claims 1, 2, 3, 4, 5, 6, 8 and/or 9 unpersuasive, the Board is respectfully requested to carefully consider the arguments set forth above in support of each of the independently patentable groups.

Respectfully submitted,

CHRISTOPHER P. MAIORANA, P.C.

Christopher P. Maiorana
Reg. No. 42,829

Dated: June 8, 2004

24840 Harper Avenue
Suite 100
St. Clair Shores, MI 48080
(586) 498-0670

IX. APPENDIX

The claims of the present application which are involved in this appeal are as follows:

1. A device comprising:

a one-piece outer portion consisting of an electrically insulative material and having dimensions effective to prevent or inhibit plasma arcing to an electrically conductive surface of an aperture through a wall of a plasma processing chamber, said one-piece outer portion further comprising:

(i) a flange section configured to remain outside of said wall;

(ii) a lower section having a shape approximate said aperture to fit into said aperture; and

(iii) an inner opening communicating through the electrically insulative material between a bottom and a top of the outer portion.

2. A plasma processing chamber having:

at least one aperture therein, the at least one aperture having an exposed electrically conductive surface, and

the device of Claim 1, located inside the aperture.

3. A method of making a plasma processing chamber, the chamber having at least one aperture therein, the at least one aperture having an exposed electrically conductive surface, the method comprising inserting the device of Claim 1 into the aperture.

4. A method of processing a workpiece, comprising the following steps:

(A) exposing the workpiece to a plasma in the plasma processing chamber of Claim 2; and

(B) transmitting a signal through the device out from the plasma processing chamber.

5. A plasma processing chamber having:

a wall;

at least one aperture through said wall, the at least one aperture having an exposed electrically conductive surface, and

a one-piece sleeve inside the aperture, the one-piece sleeve consisting of an electrically insulative material and having:

(i) dimensions effective to prevent or inhibit plasma arcing to the exposed electrically conductive surface of the aperture;

(ii) a flange section configured to remain outside said wall;

(iii) a lower section having a shape approximate said aperture to fit into said aperture; and

(iv) an inner opening communicating through the electrically insulative material from a bottom to a top of the one-piece sleeve.

6. A method of making a plasma processing chamber having a wall, the method comprising:

(A) forming at least one aperture through said wall, the at least one aperture

having an exposed electrically conductive surface; and

(B) inserting a one-piece sleeve into the aperture, the one-piece sleeve consisting of an electrically insulative material and having:

(i) dimensions effective to prevent or inhibit plasma arcing to the exposed electrically conductive surface of the aperture;

(ii) a flange section configured to remain outside said wall;

(iii) a lower section having a shape approximate said aperture to fit into said aperture; and

(iv) an inner opening communicating through the electrically insulative material between a bottom and a top of the one-piece sleeve.

7. The method of Claim 6, further comprising, prior to inserting said one-piece sleeve, the step of forming said bottom of said one-piece sleeve to a plane having a non-orthogonal angle relative to said inner opening.

8. A method of processing a workpiece, comprising:

(A) exposing the workpiece to a plasma in a chamber, the chamber having (1) a wall, (2) an aperture having an exposed electrically conductive surface through said wall, and (3) a one-piece sleeve in the aperture, the one-piece sleeve consisting of an electrically insulative material and having:

(i) dimensions effective to prevent or inhibit plasma arcing to the exposed electrically conductive surface of the aperture,

(ii) a flange section configured to remain outside said wall,

(iii) a lower section having a shape approximate a width of said aperture to fit into said aperture; and

(iv) an inner opening communicating through the electrically insulative material between a bottom and a top of the one-piece sleeve; and

(B) transmitting a signal through the one-piece sleeve out from the chamber.

9. A method of operating a plasma processing chamber, wherein the chamber has at least one aperture therein and the aperture has an exposed electrically conductive surface, the method comprising the steps of:

(A) initiating a plasma in the chamber, the aperture having the device of Claim 1 therein, then

(B) cleaning the chamber and the device.

10. The method of Claim 9, wherein said plasma exists in said chamber for a predetermined period of time.

11. The method of Claim 9, further comprising, prior to step B, the steps of:

exposing a workpiece to the plasma, and

transmitting a spectroscopic signal through the device indicating an etching endpoint.

12. The device according to claim 1, wherein

said flange section has a width that is greater than a corresponding width of said

aperture.

13. The device according to claim 12, wherein said device applies a predetermined amount of pressure against an inner wall of said aperture.

14. The device according to claim 12, wherein said lower section has a first length and said flange section has a second length.

15. The device according to claim 14, wherein said first length is greater than a length of said aperture.

16. The device according to claim 1, wherein an outer surface of said device forms an angle with reference to the bottom of said device.

17. The device according to claim 16, wherein said angle is non-orthogonal.

18. The device according to claim 1, wherein said inner opening transfers a spectroscopic endpoint detection signal.

19. The plasma processing chamber of claim 2, wherein said at least one aperture comprises an endpoint detection channel.

20. The device according to claim 1, wherein the electrically insulative

material is selected from the group consisting of ceramics, multi-crystal ceramics, polyvinyl polymers, polytetrafluoroethylene, polyethylene, polypropylene, polyimides, polycarbonates and single crystal insulative minerals.